The Role of Urodynamic Study in Evaluating Children with Non Neurogenic Voiding Dysfunction

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Abstract

To evaluate the role of Urodynamic study (UD) in children with non neurogenic voiding dysfunction.
A total number of 52 children (age 5 to 12 years) with non neurogenic voiding dysfunction symptoms (frequency, urgency, incontinence, with or without nocturnal enuresis) were evaluated in a period from February 2013 to October 2014 in AL-Sadar Medical City, Najaf. All patients had a noninvasive screening assessment consisting of a detailed voiding history, physical examination, urinalysis, ultrasonography and measurement of post voiding residual urine. All the patients had also undergone Urodynamic (UD), 12 of them the Urodynamic study was done under light general anesthesia (low dose ketamine) or sedative (midozalam) due to patient's un-cooperation. The following urodynamic parameters were measured for maximum bladder capacity (the infused volume immediately before the initiation of micturition), maximum detrusor pressure (Pdet max), bladder compliance and residual urine volume (measured by urethral catheterization). Children with clinical neurological problem were excluded from the study.
41 (78.8%) of 52 children with non neurogenic voiding dysfunction have abnormal Urodynamic findings (detrusor instability, low compliance, reduce bladder capacity).
Urodynamic study have a important role in evaluation of children with non neurogenic voiding dysfunction.

Keywords: voiding dysfunction, child, Urodynamic study.

دور تخطيط المثانة في تقييم الأطفال المصابين بأختلال التبول الغير عصبي

الخلاصة

تقييم دور تخطيط المثانة في الأطفال المصابين بأختلال التبول الغير عصبي .

٥٢ طفل (تتراوح أعمارهم من ٥ سنه الى١٢ سنه) مصابين بأختلال التبول الغير عصبي تم تقييمهم للفترة من شباط ٢٠١٣ إلى تشرين الأول ٢٠١٤ في مدينة الصدر الطبية في النجف .كل الأطفال خضعوا اولا لفحوصات أولية تتكون من أخذ التاريخ المرضي بصورة مفصلة وفحص سريري , فحص الإدرار , سونار البطن وقياس الإدرار المتبقي بعد التبول . بعد ذلك كل الأطفال خضعوا الى فحص تخطيط المثانة , ١٢منهم تم إجراء فحص تخطيط المثانة تحت التخدير العام الخفيف او التنويم بسبب عدم تعاون المريض. الأطفال المصابين بمشاكل عصبية سريريه تم استثنائهم من الدراسة.

أظهرت الدراسة أن ٤١ طفلا (٧٨.٨%) من مجموع ٥٢ طفلا مصابين باختلال التبول الغير عصبي كان لديهم تخطيط مثانة غير طبيعي .

أن تخطيط المثانة له دور هام في تقييم الأطفال المصابين بأختلال التبول الغير عصبي.

Introduction

During the first 2 to 3 years of life there is progressive development from an initially indiscriminate infantile voiding pattern to a more socially conscious and voluntary or adult type of micturition. This natural evolution of bladder control entails an intact nervous system and depends on at least three main events occurring in parallel:
(1) a progressive increase in bladder functional storage capacity;

(2) maturation of voluntary control over the urethral striated muscle sphincter; and, perhaps most importantly,
(3) development of direct volitional control over the bladder-sphincteric unit so that the child can voluntarily initiate or inhibit the micturition reflex [1].

Non-neuropathic bladder-sphincter dysfunction in children is common, in many times it only presents to us when urinary tract infection, vesicoureteral reflux, or urinary incontinence is manifested. It has been reported that 15% of 6-year-old children suffer this condition [1].

Evaluation of Non-Neuropathic Bladder Dysfunction:

Assessment of children with voiding dysfunction should consist of a detailed and structured history (natal, developmental, urological and medical), a frequency/ volume/wetting chart (voiding diary) and a thorough physical examination.. Urinalysis, uroflowmetry and pre-void and postvoid bladder ultrasound can be added. After this screening patients who will benefit from further urodynamic and/or imaging studies can be selected [2].

History: In any case, it is important to obtain a detailed history from the child and guardian. This should include relevant questions to exclude neurologic and congenital abnormalities. Bowel dysfunction can coexist in the form of encopresis, constipation, and fecal impaction and should be noted during history-taking.

Clinical examination: In addition to a general pediatric examination focusing special attention on abdominal palpation to assess for bladder distention and fecal impaction, some neurological clinical examination can be done. Genital examination should be done, consisting of inspection of the introitus in girls with special attention to the position of the urethral meatus and appearance of the hymen, and inspection of the penis in boys.g. Complete evaluation of the back should include assessing for bony misalignment and impaired ability to bend over at the waist (suggesting tethered cord). Special attention should be given to identifying cutaneous manifestations of an underlying occult spinal dysraphism (deep sacral dimple, lipoma, vascular skin discoloration, hair tuft).Examination of the lower extremities can reveal lesions compatible with neurogenic diseases affecting the spinal cord. Muscle atrophy, foot deformities, foot drop, any asymmetry of the buttocks or the lower extremities, any disturbance of gait must draw attention to the possibility of an underlying neuropathological condition. [3]

Voiding Diary: A voiding diary is used to record daily fluid intake and urine output at home under normal conditions. The number of voidings per day, the distribution of voids during the day, and each voided volume are recorded. It can also record any episodes of urgency and leakage. It is a useful tool to help identify those who maywarrant further studies, as well as in follow-up of patients [4].

Ultrasonography: All children with proved LUT dysfunction should undergo a screening US, which should be performed with the bladder full/before voiding and after voiding. Pre-void views also contribute to overall assessment of the bladder wall, lower ureteral dilatation and bladder neck appearance. Furthermore, ultrasound of the bladder can indicate if the bladder is sufficiently full to allow a normal void. Evaluation of the bladder after voiding can demonstrate residual urine. To be reliable, the post-void US should be done immediately after voiding. A residual amount of more than 10% of expected bladder capacity for age (in ml) is considered significant. Bladder wall thickness can be measured with a full and empty bladder. However, normal values are not available. [5]. US of the bladder gives additional information on the presence and severity of constipation. An impression of the bladder base and a rectal width of more than 30 mm in the absence

of the urge to pass stools is a strong signal for constipation as a comorbidity [6].

urodynamic: In the case of resistance to initial treatment, video-urodynamic studies should be considered [7].

Patients and Methods

Fifty two children with non neurogenic voiding dysfunction symptoms (frequency, urgency, incontinence, with or without nocturnal enuresis) were evaluated in a period from February 2013 to October 2014 in AL-Sadar Medical City, Najaf.

The age of those children range from 5 years to 12 years. 35 were boys and 17 were girls. All patients had a noninvasive screening assessment consisting of a detailed voiding history and a clinical examination, urinalysis, ultrasonography and measurement of post voiding residual urine. Urodynamic studies (UDS) were performed to assess bladder function. Children with clinical neurological problem were excluded from the study.

Urodynamic study: patient voided and then put in supine position and evacuate the urinary bladder by Foley urethral catheter. Double lumen catheter (8 Fr) inserted to urinary bladder to measure intravesical pressure and balloon catheter inserted into rectum to measure abdominal pressure. The urinary bladder is filled with normal saline at rate 5-10ml/mint. Bladder capacity, filling pressure, bladder compliance and uninhibited detrusor overactivity during filling are recorded. In 12 children the Urodynamic study were performed under light general anesthesia (low dose ketamine) or sedation (midozalam) due patient's uncooperation.

Results

Fifty two children with non neurogenic voiding dysfunction symptoms were evaluated. The age of those patients ranges from 5 years to 12 years. 35 were boys and 17 were girls (Table-I).

Table 1: Sex of children with non neurogenic voiding dysfunction.

Sex	No. of patients	%
Male	35	67.3%
Female	17	32.6%

The most common presentation are nocturnal enuresis (82%), frequency and urgency (74%), daytime urinary incontinence (58%) and recurrent urinary tract infection (UTI) in 62% (Table-II).

Table 2: Clinical presentation of children with non neurogenic voiding dysfunction.

Clinical presentation	%
nocturnal enuresis	82%
frequency and urgency	74%
daytime urinary incontinence	58%
recurrent urinary tract infection	62%

Twenty one of the children have bowel symptoms (constipation, encopresis). (Table –III)

Table 3: Bowel symptoms in children with non neurogenic voiding dysfunction .

Bowel symptom	No. of patients	%
normal	31	59.7%
abnormal	21	40.3%

Forty one of 52 children with non neurogenic voiding dysfunction have abnormal Urodynamic findings.(Table-IV).

Table 4: Urodynamic finding of children with non neurogenic voiding dysfunction.

Urodynamic study	No. of patients	%
normal	11	21.2%
abnormal	41	78.8%

Discussion

Non-neuropathic bladder-sphincter dysfunction in children is common, in many times it only presents to us when urinary tract infection, vesicoureteral reflux, or urinary incontinence is manifested. It has been reported that 15% of 6-year-old children suffer this condition [1].

In our study, voiding dysfunction was more common in boys (35 of 52 total cases) than girls (M/F = 2/1).

We found 78.8% of children with voiding dysfunction have abnormal Urodynamic study and 40.3% have abnormal bowel symptoms.

Abnormal bowel symptoms were noted in 40.3% of cases that had constipation or encopresis. The higher prevalence of bowel symptoms in this group suggested that constipation was a factor that exaggerated daytime symptoms.

Medel et al. found detrusor instability or decreased bladder compliance in 79% of those with voiding dysfunction [8].

In the study by Hann-Chorng, 73.3% of those with voiding dysfunction have abnormal video Urodynamic [9]. Persson-Jünemann et al. observed detrusor instability in 68% of children with voiding dysfunction [10]. Joao L. Amaro, Jose Golderg et al found that 62% of children with voiding dysfunction have abnormal Urodynamic and 51% have constipation [11].

Conclusion

Urodynamic study has a important role in evaluation of children with non neurogenic voiding dysfunction.

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